INSTRUCTIONS FOR TABLE 7

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

PURPOSE OF THE TABLE: • To provide a summary of the variables used to calculate chemical cancer risks and non-cancer hazards • To show the EPC and intake used in the non-cancer hazard and cancer risk calculations • To present the result of the calculation for each Exposure Route/Pathway for each COPC • To provide the total hazard index and cancer risk for all Exposure Routes/Pathways for the Scenario Timeframe and Receptor presented in this table.	
INFORMATION DOCUMENTED: • The non-cancer hazard quotient and unit risk for each COPC for each Exposure Route/Pathway • The values used for EPC, cancer and non-cancer intakes, reference doses, and reference concentrations.	***An alternate presentation is also available with cancer information shown on Table 7a and non-cancer information shown on Table 7b.***
TABLE NUMBERING AND SUMMARY BOX INSTRUCTIONS: • Complete one copy of Table 7 for each unique combination of the following three fields that will be quantitatively evaluated (Scenario Timeframe, Receptor Population, and Receptor Age). • Enter each combination of these three fields in the Summary Box in the upper left corner of the table. ***Note: Each combination of the three key fields and the first four columns should be found as a row in Table 1.*** • Number each table uniquely, beginning with 7.1 and ending with 7.n where "n" represents the total number of combinations of the six key fields. • Different tables should be prepared to address RME and CT non-cancer hazard calculations when appropriate. • Tables 7.1.RME through 7.n.RME should be completed for RME non-cancer and cancer hazard calculations when appropriate. • Tables 7.1.CT through 7.n.CT should be completed for CT non-cancer and cancer hazard calculations.	***It is possible that some tables may contain some of the same data associated with different descriptions in the Summary Box in the upper left corner.*** ***Separate tables may be necessary to ensure transparency in data presentation for each Exposure Pathway. Replication of information is readily accomplished using spreadsheet software.*** ***Consult the EPA rise assessor for alternatives (e.g., footnotes) to preparing multiple tables with the same data.***

INSTRUCTIONS FOR TABLE 7

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS (continued)

TABLE NUMBERING AND SUMMARY BOX INSTRUCTIONS (continued):	***When reporting cancer and non-cancer values on separate tables, use the column names to identify instructions for completing each column, as the column number will differ after Column 7.***
• An optional approach is to report cancer and non-cancer values on separate tables as follows: - Number non-cancer tables 7.1A.RME - 7.nA.RME or 7.1A.CT - 7.nA.CT, where "n" represents the total number of combinations of the three key fields. - Number cancer tables 7.1B.RME-7.nB RME or 7.1B.CT-7.nB.CT, where "n" represents the total number of combinations of the three key fields. - The first seven columns remain the same for both non-cancer or cancer tables. Columns 8-12 contain either the Cancer Risk Calculations data or the Non-Cancer Hazard Calculations data. - See the blank Planning Tables for an illustration of how Table 7 data can be separated as described above.	
GENERAL NOTES/INSTRUCTIONS FOR THIS TABLE:	
• All table entries, with the exception of Intake, Non-Cancer Hazard and Cancer Risk are presented on tables preceding Table 7. • With the exception of modeled intakes, the intake value is the result of calculations performed using parameters and equations presented in Table 4 and concentrations presented in Table 3. • The Total Non-Cancer Hazard is to be summed for each Exposure Route and Exposure Point in the Exposure Route Total and Exposure Point Total rows. The total Non-Cancer Hazard for all Exposure Pathways for a given Receptor is to be presented as the Total of Receptor Hazards Across All Media at the bottom of the table. This value represents the non-cancer hazard of the various exposure routes/pathways combined. • The total Cancer Risk is to be summed for each Exposure Route and Exposure Point in the Exposure Route Total and Exposure Point Total rows. The Total Cancer Risk for all Exposure Pathways for a given Receptor is to be presented as the Total of Receptor Risks Across All Media at the end of the table. This value represents the cancer risk of the various Exposure Routes/Pathways combined to a given receptor.	

INSTRUCTIONS FOR TABLE 7

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS (continued)

HOW TO COMPLETE/INTERPRET THE TABLE	
SUMMARY BOX IN UPPER LEFT CORNER	
Row 1 - Scenario Timeframe	
Definition: • The time period (current and/or future) being considered for the Exposure Pathway.	
Instructions: • Choose from the picklist to the right.	***Current*** ***Future*** ***Current/Future*** ***Not Documented***
Row 2 - Receptor Population	
Definition: • The exposed individual relative to the Exposure Pathway considered.	***For example, a resident (Receptor Population) who drinks contaminated groundwater.***
Instructions: • Choose from the picklist to the right.	***Resident*** ***Industrial Worker*** ***Commercial Worker*** ***Construction Worker*** ***Other Worker*** ***Golfer*** ***Jogger*** ***Fisher*** ***Hunter*** ***Fisher/Hunter*** ***Swimmer*** ***Other Recreational Person*** ***Child at School/Daycare/ Playground*** ***Trespasser/Visitor*** ***Farmer*** ***Gardener*** ***Gatherer*** ***Other***
Row 3 - Receptor Age	
Definition: • The description of the exposed individual, as defined by the EPA Region or dictated by the site.	***For example, an adult (Receptor Age) resident (Receptor Population) who drinks contaminated groundwater.***

INSTRUCTIONS FOR TABLE 7

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS (continued)

Instructions: • Choose from the picklist to the right.	***Child*** ***Adult*** ***Adolescents (teens)*** ***Pre-Adolescents*** ***Not Documented*** ***Child/Adult*** ***Geriatric*** ***Sensitive*** ***Other*** ***Infant*** ***Toddler*** ***Pregnant***
BODY OF THE TABLE	
Column 1 - Medium	
Definition: • The substance (e.g., air, water, soil) that is a potential source of contaminants in the Exposure Medium. (The Medium will sometimes equal the Exposure Medium.) Usually, the Medium is that targeted for possible remediation.	
Instructions: • Choose from the picklist to the right.	***Groundwater*** ***Leachate*** ***Sediment*** ***Sludge*** ***Soil*** ***Surface Water*** ***Debris*** ***Liquid Waste*** ***Solid Waste*** ***Air*** ***Surface Soil*** ***Subsurface Soil*** ***Other***
Column 2 - Exposure Medium	
Definition: • The contaminated environmental medium to which an individual may be exposed. Includes the transfer of contaminants from one medium to another. ***For example:*** ***1) Contaminants in Groundwater (the Medium) remain in Groundwater (the Exposure Medium) and are available for exposure to receptors.*** ***2) Contaminants in Groundwater (the Medium) may be transferred to Air (the Exposure Medium) and are available for exposure to receptors.*** ***3) Contaminants in Sediment (the Medium) may be transferred to Fish Tissue (the Exposure Medium) and are available for exposure to receptors.***	

INSTRUCTIONS FOR TABLE 7

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS (continued)

Instructions: • Choose from the picklist to the right.	***Groundwater*** ***Leachate*** ***Sediment*** ***Sludge*** ***Soil*** ***Surface Water*** ***Debris*** ***Liquid Waste*** ***Solid Waste*** ***Air*** ***Plant Tissue*** ***Animal Tissue*** ***Fish Tissue*** ***Spring Water*** ***Surface Soil*** ***Subsurface Soil*** ***Particulates*** ***Vapors*** ***Other***
Column 3 - Exposure Point	
Definition: • An exact location of potential contact between a person and a chemical or radionuclide within an Exposure Medium. ***For example:*** ***1) Contaminants are in Groundwater (the Medium and the Exposure Medium) and exposure to Aquifer 1 - Tap Water (the Exposure Point) is evaluated.*** ***2) Contaminants in Groundwater (the Medium) may be transferred to Air (the Exposure Medium) and exposure to Aquifer 1 - Water Vapors at Showerhead (the Exposure Point) is evaluated.*** ***3) Contaminants in Sediment (the Medium) may be transferred to Fish Tissue (the Exposure Medium) and Trout from Dean's Creek (the Exposure Point) is evaluated.***	
Instructions: • Provide the information as text in the Table.	***Exposure Point should be defined in the same way as was done in Planning Table 1.***
Column 4 - Exposure Route	
Definition: • The way a chemical or radionuclide comes in contact with a person (e.g., by ingestion, inhalation, dermal contact).	

INSTRUCTIONS FOR TABLE 7

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS (continued)

Instructions: • Enter the Exposure Route considered from the picklist to the right.	***Inhalation*** ***Ingestion*** ***Combined*** (i.e., Inhalation and Ingestion) ***Dermal*** ***Not Documented*** ***External (Radiation)***

INSTRUCTIONS FOR TABLE 7

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS (continued)

Column 5 - Chemical of Potential Concern	
Definition: • Chemicals that are potentially site-related, with data of sufficient quality, that have been retained for quantitative analysis as a result of the screening documented in Table 2.	
Instructions: • Enter the COPCs selected from the COPC screening.	***Table 2 documents COPC screening.***
Column 6 - EPC Value	
Definition: • The EPC, based on either a statistical derivation of measured data or modeled data, that represents an estimate of the chemical or radionuclide concentration. ***The EPC value may be statistically derived by calculating the 95% UCL of measured groundwater contaminant concentrations from multiple residential wells. Alternatively, the EPC value may be selected as a single measured value, if one data point is used to calculate the risk for each residential well individually. In some cases, the EPC value may be a modeled value (e.g., if upgradient groundwater contaminant concentrations are used to model groundwater concentration at a downgradient exposure point, or if sediment concentrations are used to model fish tissue concentrations).***	***The EPC Value may be calculated, measured, or modeled.***
Instructions: 1. Enter the EPC value for each COPC. This value should be in Table 3. 2. If an EPC other than the one found in Table 3 is used, indicate it with a footnote and include a reference to supporting information that will show how the data were modeled in the risk assessment.	***Table 3 documents EPC calculations for RME and CT.***
Column 7 - EPC Units	
Definition: • The units associated with the EPC value.	
Instructions: • Enter the units for EPC values.	***Consult the EPA risk assessor for unit preferences.***
Column 8 - Cancer Risk Calculations - Intake/Exposure Concentration Value (Also Column 8 on Table 7a)	

INSTRUCTIONS FOR TABLE 7

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS (continued)

Definition: 3. Intake is a measure of exposure expressed as the mass of a substance in contact with the exchange boundary per unit body weight per unit time (e.g. mg chemical/kg body weight/day).	***Refers to the intake/exposure concentration results using the parameters and equations, calculations and/or models presented in Table 4.***
Instructions: • Enter the result of the intake calculations/modeling or the exposure concentration performed for each COPC and Exposure Route.	***The intake equations, calculations, and/or models are documented in Table 4.***
Column 9 - Cancer Risk Calculations - Intake/Exposure Concentration Units (Also Column 9 on Table 7a)	
Definition: • The units for intake or exposure concentration for each COPC and Exposure Route.	
Instructions: • Enter the units from the intake calculation or exposure concentration for each COPC which corresponds to each Exposure Route.	
Column 10 - Cancer Risk Calculations - CSF/Unit Risk Value (Also Column 10 on Table 7a)	
Definition: 4. The slope factor is used to estimate an upper-bound probability of an individual developing cancer as a result of a lifetime of exposure to a particular level of potential carcinogen. 5. Unit Risk is a toxicity value for carcinogenic effects expressed in terms of risk per unit concentration of the substance in the medium where human contact occurs. These measures can be calculated from cancer slope factors.	
Instructions: • Enter the cancer slope factor or unit risk for each COPC which corresponds to each exposure route.	***The slope factors and unit risk values for each COPC are presented in Tables 6.1, 6.2, and 6.3.***
Column 11 - Cancer Risk Calculations - CSF/Unit Risk Units (Also Column 11 on Table 7a)	
Definition: 6. The units for the cancer slope factor or unit risk.	
Instructions: • Enter the cancer slope factor or unit risk units for each COPC for each Exposure Route.	
Column 12 - Cancer Risk Calculations - Cancer Risk (Also Column 12 on Table 7a)	

INSTRUCTIONS FOR TABLE 7

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS (continued)

Definition: • The result of the cancer risk calculation for each COPC for each Exposure Route and Exposure Pathway.	
Instructions: • Enter the cancer risk calculation for each COPC. • Sum the cancer risk results for each Exposure Route in the Exposure Route Total row. 7. Sum the cancer risk calculation results for each Exposure Point in the Exposure Route Total row. 8. Sum the total cancer risk results for all Exposure Pathways in the Total of Receptor Risks Across all Media row.	***The sum of all Exposure Routes represents the total cancer risk for all Exposure Routes/ Pathways.***
Column 13 - Non-Cancer Hazard Calculations - Intake/Exposure Concentration Value (Also Column 8 on Table 7b)	
Definition: 9. Intake is a measure of exposure expressed as the mass of a substance in contact with the exchange boundary per unit body weight per unit time.	***Refers to the intake/exposure concentration results using the parameters and equations/calculations and/or models presented in Table 4.***
Instructions: • Enter the result of the intake calculations/modeling performed for each COPC and Exposure Route.	***The intake equations, calculations, and/or models are documented in Table 4.***
Column 14 - Non-Cancer Hazard Calculations - Intake/Exposure Concentration Units (Also Column 9 on Table 7b)	
Definition: • The units for intake for each COPC and Exposure Route.	
Instructions: • Enter the units from the intake calculation for each COPC which corresponds to each Exposure Route.	
Column 15 - Non-Cancer Hazard Calculations - RfD/RfC Value (Also Column 10 on Table 7b)	
Definition: 10. RfD is the toxicity value for evaluating non-cancer effects resulting from exposures. 11. RfC is the toxicity value for inhalation.	

INSTRUCTIONS FOR TABLE 7

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS (continued)

Instructions: • Enter the RfD or RfC value. • For RfD, enter the reference dose for each COPC which corresponds to each exposure route. • Enter Oral RfD values for ingestion. • Enter Adjusted Dermal RfD values for dermal. • Enter Adjusted Inhalation RfD/RfC values for inhalation.	***The reference doses (RfD/RfC) for each COPC are presented in Table 5.***

INSTRUCTIONS FOR TABLE 7

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS (continued)

Column 16 - Non-Cancer Hazard Calculations - RfD/RfC Units (Also Column 11 on Table 7b)	
Definition: • The units associated with the reference dose or reference concentration.	***RfDs are typically reported in mg/kg-day, a dose term, RfCs in mg/m^3.***
Instructions: • Enter the units for reference dose or reference concentration for each COPC for each exposure route. • RfC is typically reported as a concentration in air (mg/m^3) which can be converted to an inhaled dose (mg/kg-day).	
Column 17 - Non-Cancer Hazard Calculations - Hazard Quotient (Also Column 12 on Table 7b)	
Definition: • The ratio of a single substance exposure level, over a specified time period, to a reference dose for that substance, derived from a similar exposure period.	
Instructions: • Enter the result of the hazard quotient calculation for each COPC. 12. Sum the hazard quotient for each Exposure Route in the Exposure Route Total row. 13. Sum the hazard quotient for each Exposure Point in the Exposure Route Total row. • Sum the hazard quotients for all Exposure Pathways in the Total of Receptor Hazards across all Media row.	***The Hazard Index represents the total non-cancer hazard for all exposure routes/pathways presented in this table.***